

The Russian T-90/T-90S Tank:

An Old Dog With Some Dangerous New Tricks

by Major James M. Warford

It incorporates elements of the T-72 and the T-80, with some revolutionary new features, including a suite of countermeasures.

Scenario

The announcement made by the Middle Eastern dictatorship of The People's Islamic Republic (PIR) — that it was breaking diplomatic ties with its two pro-Western neighbors — did not cause widespread concern in U.S. military circles. Sighting ancient territorial claims to various sections of land beyond its own borders, the fundamentalist state was again raising the level of saber-rattling in the region. The announcement did, however, add a sense of urgency and increase the level of curiosity concerning the annual military exhibition hosted by the PIR. Widespread rumors of recently purchased military hardware not previously available from the old Soviet Union were confirmed on the opening day of "Brotherhood in Arms 95" in October 1995.

Unlike similar exhibitions held around the world prior to the collapse of the Soviet Union, this surprising show went far beyond the well known armored vehicles U.S. and coalition forces defeated during DESERT STORM. The vehicles lined up on static display and shown in mobility and firepower demonstrations included the very latest the new Russian government had to offer. The appearance of the T-80U Premium Tank and the BMP-3 and BTR-90 IFVs was overshadowed by a new variant of the T-72 MBT. While this particular T-72 had already been overlooked by many of the defense press present at the show, it did not escape the attention of the U.S. military observers. What the other attendees failed to realize is that the new technology incorporated into this new T-72 variant, designated T-90/T-90S, actually gave it an edge. The Russians were apparently exporting the very best their tank building industry had to offer. According to one source, "This is not a run-of-the-mill T-72. While certainly a member of the T-72 family, it is an entirely different animal than what the Iraqis threw at us in the desert. It is, in fact, an old dog with some dangerous new tricks..."

The first unclassified information concerning the new Russian "T-90" (See cover illustration. - Ed.) began to appear in the defense-related press in the Spring of 1993. In addition to some confusion concerning the tank's exact designation (T-90 vs. T-90E vs. T-90S), and according to published reports that the new tank incorporates various components of both the T-72 MBT series and the T-80U Premium Tank, this author has designated the Russian "T-90/T-90S" as a Hybrid Premium Tank (HPT).

In March 1993, an article appeared in *Jane's Defence Weekly* describing a tank designated T-90E. The article included a photograph of a new T-72 variant fitted with reactive armor similar to that carried by the T-80U Premium Tank (PT). While this new reactive armor is very significant and will be discussed in detail below, the tank pictured was actually the latest variant in the T-72 series known as the T-72BM MBT. While a very capable and modern tank in its own right, the T-72BM provides only the starting point for the T-90/T-90S. The T-90E designator may actually belong to a particular variant of the T-90/T-90S since the letters "S" and "E" usually refer to a tank slated for the export market.

Some of the details concerning the T-90/T-90S finally came into focus with the publication of an article, with two photographs, in the October 1993 issue of *PANZER* magazine from Japan. In the first photo, a T-90/T-90S is seen conducting a firepower demonstration or gunnery exercise alongside a T-80U and what appears to be a BMD-3 airborne IFV. In the second photo, a T-90/T-90S is shown as part of a static display parked alongside a T-80U. The first photo highlights the different reactive armor and hull skirting armor carried by the T-90/T-90S and the T-80U. In addition, the two commander's cupolas are different. This is an interesting point since the cupola carried by

the T-90/T-90S is very similar to that carried by the T-64B and the diesel-powered T-80UD. As a result, the tank commander in the T-90/T-90S can operate his commander's weapon station with his hatch closed. The tank commander on the T-80U must open his hatch and expose himself to fire the machine gun.

The second photo highlights a comparison between the T-80U and the T-90/T-90S from a frontal view. Like the T-80U, the T-90/T-90S is fitted with advanced integral reactive armor on the front slope or glacis plate. The T-90/T-90S armor, however, is a slightly different design. The T-90/T-90S wind sensor mast is clearly evident, as is the reactive armor on the tank's turret front. Unlike the turret front reactive armor carried by the T-80U, which is partially hidden from view by reinforced rubber skirting attached to the reactive armor "boxes," the new reactive armor on the T-90/T-90S is plainly visible. The new hull skirting fitted to the T-90/T-90S is also clearly visible and the three square armor plates attached to the front of the hull skirts can be seen in detail. These plates probably fill the dual function of providing standoff against attack from the flank as well as facilitating the mounting of reactive armor boxes between the plates and the actual hull skirting.

Finally, this photo shows perhaps the most important characteristic of the T-90/T-90S; the fully automated "Defensive Aids Suite" (DAS) known as the TSHU-1-7 SHTORA 1¹ mounted on the tank's turret. The three primary external components of the SHTORA 1, the two infrared jammer/emitters, the laser warning receivers, and the grenade launchers, are all clearly visible in the photo. This impressive system, which will be detailed below, provides the T-90/T-90S with a truly unique defensive capability. To date, it is the only fully developed countermeasure system of its kind in the world. One of the

most threatening aspects of this new system is the fact that the vast majority of the information available on the SHTORA 1 comes from an unclassified report on the Defendory '92 arms exhibition held in Athens, Greece.² During that show the Russian manufacturer was marketing the system for export.

The firepower of the T-90/T-90S is based upon the well-known 2A46A1 Rapira 3 125-mm smoothbore main gun. In addition to the standard 125-mm HVAPFSDS, HEAT-FS, and FRAG-HE ammunition, there are two new types of ammunition available. The first type includes improved capability versions of the standard rounds. The Russians have made a concentrated effort to improve the capability of their conventional tank ammunition and have introduced new versions of all three types. The new HVAPFSDS round, designated the 3BM32, incorporates a depleted uranium long-rod penetrator. To this author's knowledge, this new round has not been used in combat. The first new HEAT-FS round, the 3BK29, reportedly has a hardened nose that can push through reactive armor and still penetrate at least 300mm of armor angled at 60 degrees. The second new HEAT-FS round, the 3BK27, has been developed but not yet put into production. This tandem projectile has **three** HEAT charges; the first detonates the reactive armor, the second charge is then fired to initiate the penetration of the target's main armor, and then the third charge is fired to complete the destruction of the target.³

The second type of ammunition available to the T-90/T-90S (as well as the T-72S MBT, T-72B MBT, T-72BM, T-80U, and T-80UD) is the 9K120/9M119 laser beam-riding antitank guided missile system. Known as the AT-11 SNIPER by NATO, the system actually includes two slightly different main gun-launched missiles. The SVIR missile is the less sophisticated of the two, and cannot be fired while on the move. This missile is used by the less sophisticated T-72 MBTs. The more capable REFLECKS missile can be fired on the move and is used by the T-72BM, T-80U, T-80UD, and T-90/T-90S. The two-piece missiles are loaded by the tank's automatic loading system and have a maximum effective range of 5,000 meters with a maximum armor penetration of approximately 750mm. There are some unconfirmed reports that the missiles have the ability to de-

feat reactive armor-protected tanks.⁴ Finally, these missiles are being offered for export by the Russians at a cost of \$40,000 per REFLECKS missile.⁵

The other key component of the T-90/T-90S firepower concerns the tank's fire control system. Labeled the "Perfect" fire control system by the Russians, it consists of the computer-based system taken from the T-80U. It includes a laser rangefinder and, possibly, the AGAVA thermal sight for the gunner. (Some of the available sources say the T-90/T-90S is fitted with a thermal sight while others continue to say that a passive light amplification sight is fitted.) The fact that the T-90/T-90S is the first Russian tank since the T-54B Model 1952 MBT not to be fitted with IR searchlights may indicate that, if the tank does not have a thermal sight as yet, it could be added in the very near future. The lack of these standard IR searchlights is one of the key recognition features of the T-90/T-90S.

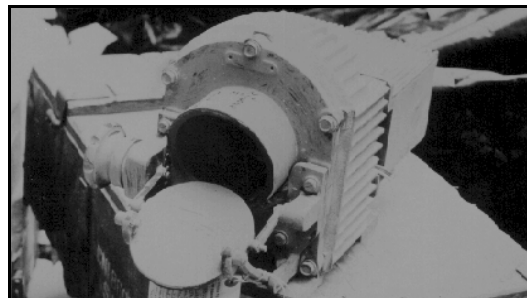
The mobility characteristics of the T-90/T-90S are impressive for a diesel-powered Russian tank, but are not revolutionary. The photographs confirm the use of the T-72BM hull and suspension system. Although some sources report that the complete turret from the T-80U is fitted, the available photos and more recent information confirm that both the hull and the turret are from the T-72BM. The tank is powered by the Model V-84 840-hp diesel engine that provides a power-to-weight ratio of 18.06 hp/ton and a maximum road speed of 60 kph. The operating range of the tank is 470 km and its combat weight is 46.5 tons.⁶

Perhaps the most significant of all the T-90/T-90S characteristics is the truly innovative defensive protection carried by the new tank. For the first time a tank has been designed and fielded incorporating a "three-tier" protection system. As has been reported previously in the pages of *ARMOR*, a modern tank fitted with composite/laminate base armor and then fitted with reactive armor would have a level of armor protection beyond the capability of most antitank weapons.⁷ The significance of this long-standing threat can be measured in the huge effort being undertaken in the West, as well as Russia itself, to field antitank weapons with the capability to defeat tanks protected by reactive armor. The Russians apparently came to the conclusion that,

in spite of the success achieved by the combination of composite/laminate and reactive armor, additional protection was required to deal with the changes in antitank weaponry. As opposed to the traditional effort of minimizing the damage done to the tank after being hit, the Russians decided to refocus their efforts on minimizing the possibility of the tank being hit. The appearance of the T-90/T-90S has ushered in the Defensive Aids Suite (DAS) era.

The unclassified information concerning the composite/laminate base armor of Russian tanks is extremely limited. It is known that the T-64 series, T-72 series, and T-80 series tanks incorporate composite/laminate turret front and front-slope or glacis armor. While the exact design and capabilities of each type of composite/laminate armor used probably vary according to the tank's intended role and export status, tanks fitted with this type of armor have long been available on the export market. Since DESERT STORM, photographs of destroyed Iraqi T-72M1 MBTs clearly show their front-slope armor to consist of a five-layer array, with two outer layers of steel, two middle layers of a non-metallic material, and a single inner layer of steel. Although the armor carried by the T-90/T-90S is certainly more advanced than this old design used by the T-72M1, the description above does provide some insight into the work the Russians have been conducting concerning "combination armor" since the 1960s. The most likely scenario is that the T-90/T-90S incorporates the same advanced frontal armor carried by the T-80U. Since the fire control system from the T-80U is already a part of the hybrid T-90/T-90S, it can certainly be assumed that the most effective armor design available would also be used.

The capabilities, advantages vs. disadvantages, and significance of reactive armor have been discussed in detail in the defense-related press for many years. Reactive armor such as Israeli Blazer armor, first identified in 1982, and Russian first generation reactive armor, seen fitted to the T-64BV and T-80BV (V=VZRYVNOI or explosive) in 1984/85 are fairly well known. With the introduction of the T-72BM, T-80U, and T-90/T-90S, however, the reactive armor equation has changed. Known as advanced integral reactive armor, second generation reactive armor, or by the market name of "KONTAKT-5,"⁸ this new reactive armor may force the



An early — and unsuccessful — attempt at a countermeasure to missiles like the TOW and Dragon, these infrared “dazzlers” (above) were discovered on Iraqi tanks in DESERT STORM.

The device is mounted on the top of the left side of the turret roof, next to the hatch, in photo at left. Newer versions appear on the T-90 (see cover illustration) above main gun mantlet.

majority of the world's weapons designers back to the drawing board.

According to *Armed Forces Journal International*, KONTAKT-5 was shown by the Russians during an international arms exhibition held at Nizhni Novgorod in September 1994. First identified in 1989 carried by the T-80U, the September arms show was the first time the new reactive armor was shown to the public. The capabilities of KONTAKT-5 reportedly go far beyond those of the older, more well-known reactive armor. “Unlike the first generation explosive reactive armor, the new KONTAKT-5 helps defeat both shaped-charge warheads and kinetic energy tank rounds.”⁹ If fitted to a T-55 MBT, KONTAKT-5 will increase the armor protection level against kinetic energy ammunition from the equivalent of 200mm of RHA to the equivalent of 480mm of RHA.¹⁰ If KONTAKT-5 does have the ability to significantly degrade the penetrating power of APFSDS and HVAPFSDS ammunition, the T-90/T-90S (and maybe the T-80U and T-72BM as well) may constitute the single most serious threat to U.S. and Western armored forces since the appearance of the T-64 Base Model in 1967.

The third tier of the T-90/T-90S protection system is certainly the most revolutionary characteristic of the new tank. The TSHU-1-7 SHTORA 1 (meaning shutter or blind) Defensive Aids Suite was developed by the Russian Mobile Vehicle Engineering Institute in St. Petersburg. The system consists of two to four laser-warning-receivers (LWRs), one or two wide-band

infrared (IR) jammer/emitters, special grenades fired from the tank's standard turret grenade launchers, and a central computer.¹¹ An examination of the photo that appeared in *PANZER* confirms that the T-90/T-90S is fitted with

special grenades are automatically fired from the tank's grenade launchers. The aerosol smoke screen created by these grenades obscures the targeted tank from the source of the laser beam, thus preventing the guidance of the projec-

“...The tank's LWRs detect the projectile's guidance beam as soon as the targeted tank is illuminated. Once the beam is detected, the turret is automatically oriented in the direction of the laser beam and special grenades are automatically fired from the tank's grenade launchers.”

at least two sets of LWRs on the turret roof (above the main gun and above the turret storage box on the left side of the turret) and two IR jammer/emitters (one on each side of the main gun). According to published reports, the system is designed to counter semi-automatic, command to line-of-sight (SACLOS) antitank guided missiles and laser-guided projectiles.

Against ATGMs, the two IR jammer/emitters confuse incoming missiles by causing the missile launcher to lose contact with the missile's IR locator or beacon while the missile is in flight. Without receiving the correct guidance instructions from its launcher, the missile simply flies into the ground short of the intended target. The two IR jammer/emitters are permanently turned on while the tank is in combat.¹² Against laser-guided projectile attack, the tank's LWRs detect the projectile's guidance beam as soon as the targeted tank is illuminated. Once the beam is detected, the turret is automatically oriented in the direction of the laser beam and spe-

tile to the target. The smoke screen requires less than three seconds to fully develop and lasts for about 20 seconds. According to the Russian company's brochure, the SHTORA 1 DAS can operate continuously for six hours and is most effective against antitank weapons like the U.S. TOW, DRAGON, HELLFIRE, MAVERICK, and laser-guided artillery projectiles. The brochure also states that the SHTORA 1 reduces the chance of a tank being hit by the weapons listed above by four to five times.¹³

Although the SHTORA 1 DAS has not been tested in combat, two much less sophisticated counter-ATGM devices were employed by the Iraqis during DESERT STORM. Known as “dazzlers” in the defense-related press, each consisted of a small IR beacon mounted on the turret of Iraqi T-72M1 MBTs. The first, apparently manufactured in Iraq, used a ventilated cylinder housing with a small round door at the front to protect the light. The second, reportedly imported from China, was carried in a different housing that was

The Russian T-80U is another first-line tank now available to the export market. Since the breakup of the Soviet Union, the old policy — of selling only less-capable equipment — has changed in light of the need for hard currency.



round at the front but box-shaped at the rear. While also using a small round door at the front, this device had a much more sophisticated overall appearance than the first. Both systems emitted an IR light that was intended to confuse the IR tracker of an ATGM launcher, thus preventing it from sending the correct guidance instructions to the in-flight missile. According to published reports, these two systems did not perform well during the war. Although these two Iraqi systems are similar in some ways to the T-90/T-90S SHTORA 1 DAS, they represent the infancy of this technology and are certainly generations behind the comprehensive capabilities of the SHTORA 1.

The three-tiered protection system incorporated into the T-90/T-90S (advanced composite/laminate base armor, KONTAKT-5 second generation reactive armor, and the SHTORA 1 DAS) provide this new tank with a higher level of protection than any other former Soviet or Russian tank. It appears that the Russians have managed to produce a new tank that incorporates a level of protection approaching that of much larger and heavier U.S. and Western MBTs, within the size, shape, and weight constraints of the T-72BM.

The T-90/T-90S was first shown to the public at an arms exhibition held near Moscow at Kubinka in the summer of 1993. The status of the new tank in Russia and the Russian Army, however, is not clear. One unclassified source reports that the T-90/T-90S is in full production and has been delivered to the Russian Army.¹⁴ Another source reports that a series of competitive trials were

held in June 1993 putting the T-90/T-90S up against the T-80U. While the results of this competition are not known, the goal was apparently the adoption of the competition winner as the single "unified tank" for the Russian Army.¹⁵ When the innovative technologies and advanced capabilities of this new tank are combined with the fact that it is here today (and potentially already fielded by the Russian Army), the T-90/T-90S can only be regarded as a very serious threat. What makes the T-90/T-90S even more dangerous is the very real possibility that it will appear on some battlefield in the near future with non-Russians at the controls.

Notes

¹Shishlevskiy, Valentin, "Russia's New T-90 MBTs Are in Full Production," *Asian Defence Journal*, September 1994, p. 111.

²Journal Staff, "Defendory '92, Smaller But Busier," *International Defense Review*, December 1992, p. 1195.

³Foss, Christopher F., "Russia's Rounds Revealed," *Jane's Defence Weekly*, 9 October 1993, p. 26.

⁴Foss, Christopher F., "Missile-firing T-90 is Russia's Latest MBT," *Jane's Defence Weekly*, 6 March 1993, p. 5.

⁵Ibid.

⁶Shishlevskiy, p. 111.

⁷Warford, James M., "Reactive Armor: New Life for Soviet Tanks," *ARMOR*, January-February 1988, p. 11.

⁸Zaloga, Steven J., "New Wares in Nizhni Novgorod: A Once-Secret City Opens Its

Gates," *Armed Forces Journal International*, November 1994, p. 32.

⁹Ibid.

¹⁰Ibid.

¹¹de Briganti, Giovanni, "Russian Firms Tout Three Tank Defensive Systems for Export," *Defense News*, 27 September 1993.

¹²Ibid.

¹³Ibid.

¹⁴Shishlevskiy, p. 111.

¹⁵Zaloga, Steven J., "Trends in Russian Tank Design," *Jane's Intelligence Review*, June 1994, p. 248.

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